

KULVIR JAYDEEP CHAVDA

+1 447-902-1541 • chavda2@illinois.edu • chavdakulvir@gmail.com • 601 S 6th St, Champaign, IL, 61820 • www.kulvirchavda.com • <https://www.linkedin.com/in/kulvirchavda/>

SUMMARY

I am an Aerospace Engineering student and pilot-in-training whose curiosity about the unknown has grown into hands-on research in robotics and controls. At Illinois, I work on and aim to continue developing autonomy and flight systems for drones and multi-robot platforms in GPS-denied environments, combining technical rigor with field testing. My goal is to advance robotics that expand humanity's reach in space and eventually take those systems off planet myself as an astronaut.

EDUCATION

University of Illinois at Urbana-Champaign
Bachelor of Science in Aerospace Engineering
Minor: Computer Science
James Scholar Honors
GPA: 3.83/4.00

Champaign, IL
Graduation: May 2026

Relevant Coursework: Aerospace Numerical Methods; Control Systems; Dynamical Systems; Flight Mechanics & Aircraft Flight Mechanics; Incompressible & Compressible Flow; Aerospace & Applied Structures; Systems Design I (in progress); Aerodynamics & Propulsion Lab (in progress); Autonomous Systems Lab (in progress); Independent Study in Robotics & Controls (in progress); Thermodynamics; Engineering Materials; Linear Algebra & Differential Equations; Applied Machine Learning; Data Structures; Data Visualization; Electrical & Electronic Circuits.

Parkland College Institute of Aviation

Savoy, IL

FAA-Approved Private Pilot Certification, Institute of Aviation (Part 141 Program)

Graduation: May 2026

Enrolled in ground school covering aerodynamics, navigation, regulations, and weather, alongside flight training in single-engine aircraft. The program combines classroom instruction, simulator practice, and supervised flight hours as part of the requirements for the FAA Private Pilot Certificate.

RESEARCH EXPERIENCE

Nonlinear Autonomous Control, Exploration, Intelligence, and Systems (N-ACXIS) Lab, UIUC

Urbana, IL

Undergraduate Researcher – GNC, Autonomous/Embedded Systems, & Test Design

November 2024 - Present

Advisor: Dr. Hiroyasu Tsukamoto

- Develop **3 real-time experiments** to validate 3D Guidance, Navigation and Control (GNC) algorithms, integrated with machine learning, for swarms of heterogeneous UAVs navigating unmapped, **GPS-denied** environments.
- Implement ROS2/Python based autonomy stack integrating **SLAM**, multi-agent coordination, and robust obstacle avoidance on **3+ UAVs & ground-based robots**.
- Utilize the **Qualisys** Motion Capture System & On-board SLAM in robots at the UIUC drone research lab.
- Simulate and optimize nonlinear flight dynamics using **LQR**, **PID**, and other control techniques in Python.
- Design and execute full experimental pipeline from control law modeling to log analysis and performance evaluation.
- Prepare **weekly technical presentations** to keep Dr. Tsukamoto updated on progress and further plans.

Department of Aerospace Engineering at UIUC, Independent Research

Urbana, IL

Undergraduate Researcher & First Author – Numerical Methods & Data Analysis

May 2023 - May 2024

Advisor: Heather Arnett (Dr. Joshua L. Rovey as a secondary advisor)

- Utilized rocket flight data (**24 flights**), thrust tests, & Python to write an algorithm that predicts accurate rocket trajectories.
- Conducted **25+ solid rocket-motor thrust tests** to create accurate thrust curves to plug into python algorithms.
- Designed the algorithm structure and developed a Python application with a **GUI** to take user input and output graphs depicting altitude vs. time and drag force vs. time for the model rocket, both with/without drag.
- Gained approval from the university to submit an abstract to the **2024 AIAA Region III Conference**, and got accepted.
- Wrote a paper and polished it over 6 months with advice from Heather Arnett (STEM Advisor) and my professors.
- Prepared detailed schematics and visuals for my conference presentation and delivered a **30-minute talk** on the same.

Laboratory of Advanced Space Systems at Illinois

Undergraduate Research Student (ENG 491 – Nanosatellite Design Build I)

Professor: Dr. Michael Lembeck

Urbana, IL

January 2024 - May 2024

- Trained/Certified to use 3D printers, thermal vac chamber, solar simulator, soldering machines, and other lab equipment.
- Assisted in the foundational design & development of a Zero-G chemical-electrospray propellant **dual-feed** system.
- Accounted for material and instrumentation requirements to prepare a list of parts for the dual-feed system within **2 weeks** and spearhead **initial cost analysis**.
- Prepared detailed engineering requirement documentation by working closely with PhD students and fellow undergrads.

PUBLICATIONS & PRESENTATIONS

Publications: Chavda, K. J., Arnett, H. R. (2024). Using the Drag Equation and Euler's Method in Python to Predict Model Rocket Flight Trajectories. AIAA Region III Student Conference 2024, Akron, OH. Paper ID: AIAA 2024-84150. [DOI: 10.2514/6.2024-84150](https://doi.org/10.2514/6.2024-84150)

Conference Presentations: As an undergraduate researcher, I have presented technical findings at regional conferences and student competitions, gaining experience in oral delivery, Q&A sessions with faculty, and communicating research to **both technical and general audiences**.

Posters & Internal Discussions: I regularly shared progress in lab meetings and project reviews, from **weekly** N-ACXIS updates to independent study pitches. These talks gave me experience explaining complex aerospace and robotics concepts clearly and receiving constructive feedback from faculty and peers.

Events & Outreach Presentations: I presented aerospace projects to sponsors, securing over **\$2,500** in funding, and led outreach sessions through the DoD-funded NDEP program that introduced **100+ teachers and students** to rocketry and avionics. These experiences strengthened my ability to connect technical work with broader audiences and inspire interest in exploration.

WORK EXPERIENCE

Stratos Aircraft, Inc.

Redmond, OR

Aerospace Engineering Intern – Flight Controls & Structural Systems

May 2025 - August 2025

- Assisted with mechanical design, drafting, and manufacturing of flight control systems, landing gear, and other critical onboard subsystems.
- Collaborated directly with welders, machinists, and technicians to align engineering intent with shopfloor capabilities, streamlining fabrication and reducing iteration cycles.
- Drafted and revised **100+ engineering parts and assembly drawings**, ensuring adherence to FAA certification guidelines and internal engineering standards.
- Gained practical exposure to **FAA certification** processes and mechanical airworthiness through firsthand involvement in design compliance efforts.
- Integrated feedback from structural engineering reviews, incorporating FEA and test/simulation-based design changes to enhance system robustness.
- Took full ownership of **4-6 mechanical design, DFM, or drafting projects per week**; communicated progress and questions in weekly team meetings with senior engineers and leadership.

Adani Defense & Aerospace

Ahmedabad, India

Aerospace Engineering Research & Development Intern

June 2024 - August 2024

Project: Short Range Missile Development for Counter-drone Systems

- Conducted foundational research and design to give proof-of-concept to a novel short-range missile system.
- Generated **50+ detailed system and design requirements** to support a full concept-to-prototype development cycle.
- Conceptualized **3 engineering design variants**, with CAD, for within **2 weeks** to kickstart project development.
- Designed vehicle trajectory manually and modelled it using Python to design appropriate control systems for the vehicle.
- Modeled and optimized propulsive/aerodynamic forces; conducted 3 trade studies on structural integrity under loading.
- Led weekly PFMEA sessions to identify design risks and reduced estimated manufacturing time by **up to 50%**.
- Authored a **40-page engineering report** presenting modeling, design analysis, trade-offs, and development roadmap.

Space Technology and Aeronautical Rocketry (S.T.A.R.)

Avionics Engineering Intern

Ahmedabad, India

January 2021 - February 2021

- Trained to use industry-tested software for rocketry, avionics, and systems analysis for use during the internship.
- Led a **6-person team** assigned to avionics subsystems to design and write **two 30-page detailed engineering design reports** on a 'Static Solid Rocket Motor Test Pad' and a 'High Powered Rocket'.
- Presented technical and sales pitches for each system to company leadership. We secured approval on the first attempt.
- Networked with **20+** talented individuals from across India that led to forming, and leading, a team for the Mars Society South Asia – International Planetary Aerial Systems Challenge in March of 2021.

TEACHING EXPERIENCE

Department of Aerospace Engineering at the University of Illinois

Urbana, IL

Aerospace Educational Development and Outreach Mentor

April 2023 - May 2024

- Selected from a pool of over 20 undergraduate students who applied to work under the Aerospace engineering department's **NDEP (National Defense Education Program) DoD grant**.
- Mentored **20+ STEM teachers & 50+ students** on the fundamentals of rocket science through hands-on workshops using **150+ rockets**, custom avionics, and an intricately planned series of lectures.
- Guided students in building and analyzing rocket systems, forming a well-informed hypothesis, planning test flights, collecting flight data, and deriving design-performance insights.
- Identified and implemented course improvements through detailed surveys that improved course structure & effectiveness to expand the program into more Illinois classrooms.

iFly Indoor Skydiving Robotics Competition, Minorities in Aerospace

Urbana, IL

Student Engineering Mentor

November 2022 - December 2022

- Selected after two rounds of interviews to assist as an engineering mentor to 5+ middle school and high school students from Wolcott College Prep, Chicago.
- Conducted weekly meetings with students to develop a spherical flapping robot to oscillate in a skydiving chamber.
- Utilized tools & parts supplied from Wolcott to build and iterate on a physical prototype that would be shipped to iFly.
- Achieved our goal of having the robot oscillate up and down in an indoor skydiving chamber by using retractable wings.

COSMOLOGICAL (Personal Project)

Ahmedabad, India

Founder, Writer, and Site Administrator (www.cosmological.in)

January 2019 - Present

- Sustained early interest in physics and space led me to launch COSMOLOGICAL (2019), a public-facing site for accessible explanations of astronomy and cosmology.
- Applied the Feynman technique to develop clear, plain-language articles and learning guides.
- Grew COSMOLOGICAL from a personal blog into a public resource with a steady readership and **40+ email subscribers**, focusing on clear explainers (e.g., relativity, time dilation, black holes, etc.).

PROJECT EXPERIENCE

Minorities in Aerospace (MAero UIUC), University of Illinois

Urbana, IL

Head of Technical Projects

January 2023 - Present

- Plan, advise, and recruit engineering students for any technical initiatives undertaken by MAero.
- Lead **3 technical project teams**: High-altitude sounding rocket, Sustainable student-built airplane, and a Fully 3D-printed modular autonomous drone.
- Coordinate and oversee system requirements, budgeting, prototyping, and timeline planning across multidisciplinary teams of **over 20 students**.
- Secured **\$2,500+** in funding from Blue Origin and organized aerospace research events featuring 5+ UIUC faculty.

Department of Defense S.T.E.M. Vertically Landed Rocket Challenge

Bloomington, IL

Project Systems Engineer – Systems Optimization & Prototyping

August 2023 - November 2023

- Volunteered and assembled a team of 6 engineering students, over a month, to represent the University of Illinois at the Department of Defense VLR Challenge.
- Built & optimized a dual-servo system enabling a solid-fueled lander to reorient and land on descent after being dropped from a height of **30 meters**.

- Programmed and tuned onboard avionics to control burn timing, burn orientation, and collect inertial and altimetric data across **5 test flights**.
- Utilized simulation and test data to refine system parameters and improve stability margins by **40%** across tests.

L1 Altitude Model Rocket Build

Urbana, IL

Designer, Engineer, and Fabricator

August 2023 - December 2023

- Participated in an extracurricular rocketry course offering from a student organization to attempt to build my own H/I-class model rocket to apply for a L-1 Rocketry Certification.
- Designed over the course of 4 months to cross an altitude target **2000ft** and utilized manufacturing techniques like 3D-printing and laser cutting to complete the prototype.
- Was successfully launched by a group of certified students and exceeded expectations by **over 500ft**.

International Planetary Aerial Systems Challenge, Mars Society South Asia

Ahmedabad, India

Avionics Team Lead & Engineer

March 2021 - June 2021

- Designed a theoretical prototype for an unmanned aerial vehicle capable of carrying out man-assisted missions on Mars.
- Led the Avionics/GNC sub-team of **14 graduate/undergraduate students** to develop custom electronics, system architecture, algorithm flowcharts, and programs required for the system.
- Facilitated full team meetings (**50+ graduate & undergraduate students**), as the youngest sub-system lead, to make sure all sub-systems maintain a good line of communication and minimize technical misunderstandings.
- Simulated functioning of mission avionics using industry-tested software and **reduced avionics weight by 20%**.
- Developed and prepared documentation on a grid-based terrain-hugging navigation system using Martian data from NASA within 2 weeks to minimize risk of crashes.
- Wrote, edited, and verified the avionics and GNC section of our engineering design report over 3 months with my team.

HONORS AND AWARDS

- AIAA Region III Student Conference 2024 – **3rd Place Winner**, Undergraduate Category
- Dean's List, Grainger College of Engineering (Fall 2024) – Junior-year 1st semester; GPA: **4.00**
- James Scholar Honors, University of Illinois at Urbana-Champaign (Inducted in 2024)
- Blue Origin RSO Funding Award – **\$2,500** (March, 2023)
- Mars Society South Asia, International Planetary Aerial Systems Challenge – **4th Place** of 26 teams (2021)

SKILLS

Programming & Software: Python, C/C++, MATLAB, Simulink, ROS2, Linux/Unix, Java, Arduino, HTML/CSS/JS.

Robotics & Controls: SLAM and state estimation, multi-robot coordination, LQR/PID/robust control, autonomy stack integration, motion-capture (Qualisys), log analysis.

Aerospace & Simulation: FreeFlyer (Orbital Mechanics), OpenRocket, BurnSim, CFD & FEA fundamentals.

CAD & Fabrication: SolidWorks, Siemens NX, Fusion 360, CATIA, 3D printing, prototyping.

Electronics & Avionics: Eagle EDA, Proteus V8, soldering, wiring harnesses, avionics integration.

Data & Visualization: Applied Machine Learning, Data Structures (CS 225), Data Visualization (CS 416), linear algebra & numerical methods.

REFERENCES

Carsten Sundin

- **Role:** Chief Executive Officer – Stratos Aircraft, Inc.
- **Contact:** Email: csundin@stratosaircraft.com, Office Phone: +1 716-237-8434

Dr. Hiroyasu Tsukamoto

- **Role:** Lead Researcher & Supervisor – N-ACXIS Lab at the University of Illinois Urbana-Champaign
- **Contact:** Email: hiroyasu@illinois.edu

Heather Arnett

- **Role:** Supervised 1st Publication; STEM Coordinator at the University of Illinois Urbana-Champaign
- **Contact:** Email: hrb2@illinois.edu